AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Preliminary Report – Queensland and South Australia system separation on 25 August 2018

7 September 2018

A preliminary operating incident report for the National Electricity Market – information as at 9:00 am, Monday 3 September 2018

Important notice

PURPOSE

AEMO has prepared this report to provide preliminary information about the Queensland and South Australia network separation that occurred on 25 August 2018.

DISCLAIMER

The information in this report is preliminary in nature and subject to confirmation. Acquisition and analysis of data by AEMO is incomplete and the initial findings may therefore change. Any views expressed in this report are those of AEMO unless otherwise stated, and may be based on information given to AEMO by other persons.

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ABBREVIATIONS

Abbreviation	Term
AEMO	Australian Energy Market Operator
AEST	Australian Eastern Standard Time
APD	Alcoa Portland Aluminium
FCAS	Frequency Control Ancillary Service
MW	Megawatt
NEM	National Electricity Market
NER	National Electricity Rules
QLD	Queensland
NSW	New South Wales
VIC	Victoria
SA	South Australia
TAS	Tasmania
UFLS	Under Frequency Load Shedding
AUFLS	Adaptive Under Frequency Load Shedding
QNI	Queensland – New South Wales Interconnector
TNSP	Transmission Network Service Provider

Executive summary

This report provides preliminary information about the events that occurred on 25 August 2018 across the National Electricity Market (NEM) power system. This report is based on data available to AEMO up to 09:00 on Monday 3 September 2018. Information, data and observations in this report are likely to change or be refined as new information and analysis becomes available.

On Saturday 25 August 2018, at 13:11, the NSW-QLD interconnector (QNI) tripped, separating the Queensland region from the rest of the NEM power system. This resulted in the separation of the South Australia region from the rest of the NEM, and under-frequency load shedding (UFLS) in the New South Wales, Victoria, and Tasmania regions. All load was successfully restored by 15:28.

A provisional sequence of events and timing is shown below. Some details remain subject to confirmation.

Table 1 Provisional sequence of events and timing – event and restoration

Time	Events/Comments
Saturday 25 August 2018	
13:11:39	Dumaresq – Bulli 8L 330 kV Line tripped (QNI) Dumaresq – Bulli 8M 330 kV Line tripped (QNI)
13:11:41	Tamworth – Armidale 86 330 kV Line tripped at Armidale end only
13:11:45	Automatic Adaptive UFLS-2 scheme trip of TAS industrial load 81 MW
13:11:46:901	SA separated from VIC at Heywood Terminal station
13:11:47:686	Automatic UFLS scheme trip of one Alcoa Potline 278 MW (VIC)
13:11:47	Automatic UFLS scheme trip of two Tomago potlines 617 MW (NSW)
Timing to be confirmed	Automatic UFLS scheme trip of load: • Endeavour Energy 12 MW (20,000 customers) • ActewAGL (ACT) 5.5 MW • AusGrid 60 MW (45,000 customers) • Essential Energy 45 MW (30,000 customers) • Industrial load 2 MW
13:12:54	Permission to restore TAS industrial load
13:20	Separation constraints applied
13:30	AEMO authorised to synchronise VIC and SA
13:33	Tomago Potlines given permission to restore load
13:35:50	Vic – SA tie lines both circuits restored and synchronised
13:38	Alcoa Potline given permission to restore load
13:44	TAS industrial load restoration commences
13:44	AEMO gave permission to restore remaining NSW customer load
13:58	Alcoa Potline restored
14:20:16	8L Dumaresq – Bulli Line restored
14:20:16	QLD and NSW re-synchronised
14:33	8M Dumaresq – Bulli Line restored

Time	Events/Comments
15:15	AEMO reclassified simultaneous trip of 8L and 8M lines as a credible contingency and applied reclassification constraints.
15:28	All remaining NSW load restored
Sunday 26 August 2018	
10:39 to 17:39	AEMO issued a series of market notices of forecast LOR 2 conditions in NSW for 27 and 28 August (due to QNI constraints)
17:45	After receipt of advice from Powerlink that the cause was lightning strikes to transmission infrastructure impacting both circuits, AEMO cancelled reclassification of the simultaneous trip of 8L and 8M lines as a credible contingency and subsequently cancels forecast LOR 2

Separation of Queensland region

QNI comprises two circuits strung on single tower structures. Just prior to the event, 857 MW was being transferred from QLD to NSW. Powerlink advised AEMO on the evening of Sunday 26 August that it had found evidence of a flashover consistent with a lightning strike at the fault location. AEMO's detailed investigation will examine the evidence of lightning to confirm the cause of the trip.

The simultaneous trip of two adjacent single circuit transmission lines due to a single or simultaneous lightning strike is a highly improbable occurrence. Prior to this event, QNI was not considered vulnerable to lightning as there was no 'probable' or 'proven' risk of simultaneous strikes impacting both lines. Accordingly, the trip of QNI was not reclassified as credible due to the storm activity in the area on 25 August 2018. The QNI lines will be added to the vulnerable[1] list while investigation is ongoing.

Subsequent events

The following is a high-level summary of AEMO's preliminary analysis for the subsequent load shedding and SA separation. This is based on data gathered from AEMO and TNSP systems to date and remains subject to verification.

The QNI trip caused power system frequency to drop in NSW, VIC, and SA. This frequency drop, combined with changes in the power flow on the Heywood interconnector, led to the activation of the Heywood Emergency Control Scheme and separation of SA from VIC around 8 seconds later.

This separation caused a further reduction in power system frequency in the VIC, NSW island, which triggered emergency UFLS in VIC and NSW to restore the balance of supply and demand.

AEMO's detailed analysis will examine the operation of all control schemes, as well as responses from transmission and distribution-connected generation and other power system equipment across the mainland regions.

In response to the decline in frequency on the mainland, the Basslink interconnector automatically increased power transfer from TAS to VIC to support mainland frequency, as designed, causing frequency to fall in TAS. TAS's Adaptive UFLS scheme then automatically operated to disconnect contracted interruptible industrial load.

Energy prices did not increase significantly in any region other than QLD in the half-hour after the event and did not reach the market price cap in any region. Frequency control ancillary services (FCAS) prices reached market price cap in all mainland NEM regions.

[1] Vulnerable transmission lines are double circuit transmission lines which fall into the categories for Probable or Proven as described in AEMO's Power System Security Guidelines (SO_OP_3715), available at https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Power-system-operation/Power-system-operating-procedures.

Next steps

AEMO's investigation of the events of 25 August 2018 is ongoing. The investigation will seek to establish:

- Detailed sequence of events based on validated data.
- Operation of protection equipment on all lines and interconnectors that tripped.
- Performance of network control schemes.
- FCAS response of generators enabled to provide FCAS.
- Synchronous and asynchronous generator responses, including distributed generation. This will include a comparison to responses predicted by simulation models.
- Market response.
- Recommended actions for mitigation and improvement.

Investigation of this event will require AEMO to collect and analyse data from registered participants in the NEM to assess both the cause and effects of the event, as well as the individual and combined responses of equipment within the power system, at both the transmission and distribution level.

The following should also be noted:

- Data and information will need to be provided by registered participants, who have (under the rules) up to 20 business days to respond to AEMO's information request. Requests were issued on Monday 27 August 2018.
- AEMO may need to request additional information from participants following initial analysis of this data.
- Given these considerations, a timeline for publication of the detailed investigation report is yet to be determined, but unlikely to be before late October 2018.

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1. Report objective

This is AEMO's preliminary report into the separation of the Queensland (QLD) and South Australia (SA) regions from the remainder of the National Electricity Market (NEM) and associated load shedding on Saturday 25 August 2018. It is intended to provide an initial overview of the sequence of events, load restoration, and market impacts during the event. The report sets out the key next steps for finalising AEMO's incident reporting under clause 4.8.15 of the National Electricity Rules (NER).

1.1 Limitations of this report

This report is based on preliminary analysis of data obtained from AEMO systems and provided by transmission network service providers (TNSPs). While these sources are considered reliable, the data does not comprise all of the power system information necessary to complete AEMO's investigation of the event.

AEMO requires high speed monitoring data from devices in the field, within TNSP systems and from generating plant to complete a thorough analysis to support conclusive findings and recommendations. This data is in the process of being obtained and (in accordance with NER timeframes for the provision of information by registered participants) is expected to be provided to AEMO by late September. AEMO notes that the analysis of that data may identify additional aspects of the event that require investigation before the review can be completed.

1.2 Report format

This report is divided into the following sections:

- Pre-event – the weather and status of the power system across the NEM on 25 August 2018, prior to the events commencing at 13:11:39.
- Event – the sequence of events on the power system that occurred in each region in response to the sudden, non-credible loss of the QNI transmission lines.
- Restoration – the sequence of steps taken to re-synchronise the SA and QLD regions and to restore power supply to all customer loads that were shed due to the separation events.
- Market impacts – a brief overview of energy and frequency control ancillary services (FCAS) prices immediately before and during the power system events that occurred on 25 August 2018.
- Next steps – an outline of the work to be completed by AEMO before publishing its final incident report.

References to times in this report, unless otherwise specified, are to Australian Eastern Standard Time.

2. Pre-event

This section outlines the environmental conditions and state of the power system moments prior to the events resulting in the separation of QLD and SA from the rest of the NEM and 1,100 megawatts (MW) of load shed in under-frequency load shedding (UFLS) schemes.

2.1 Weather

2.1.1 Weather overview on 25 August 2018

The weather conditions for Saturday 25 August 2018 are described below:

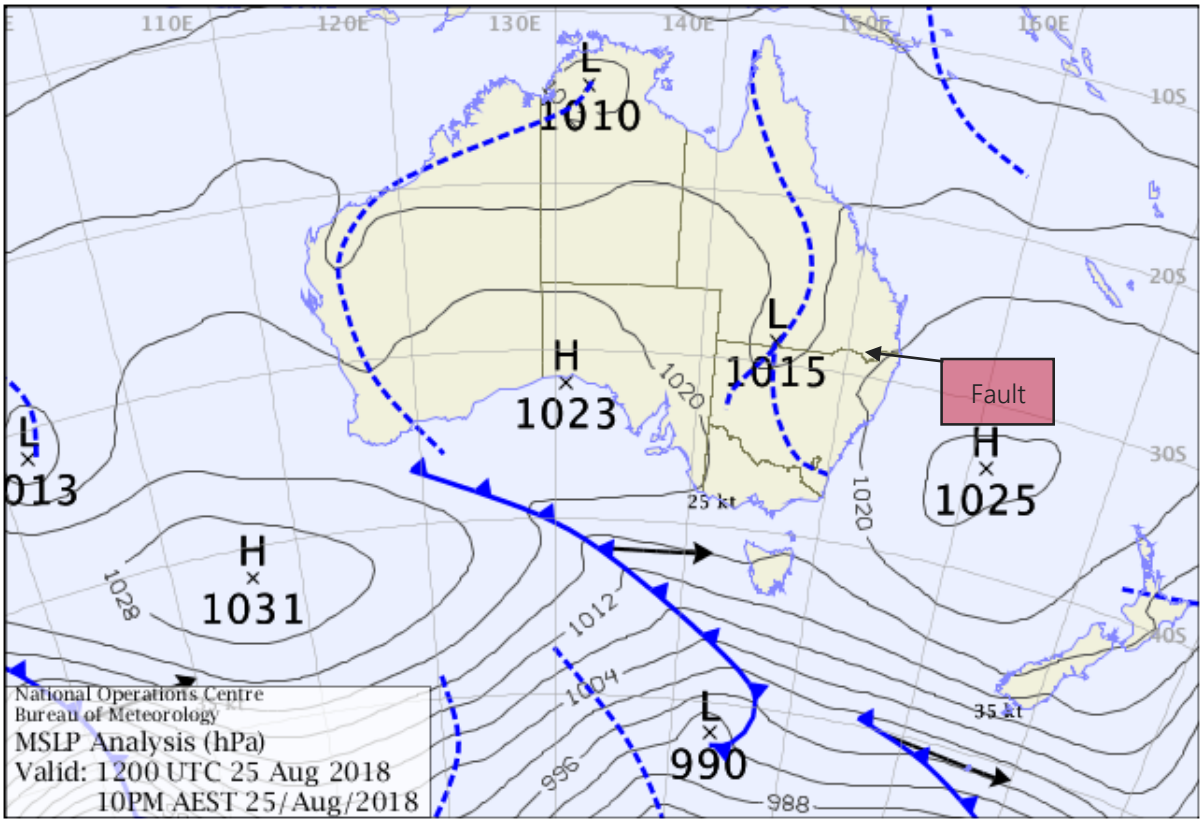
Southern QLD and northern New South Wales (NSW):

- An upper low shifted slowly eastwards over the southern interior of QLD before moving in a southeast direction into NSW on Sunday 26 August.
- This upper low combined with a deepening surface trough to produce showers, patchy rain and thunderstorms over southern QLD and northern NSW districts Saturday and into Sunday.

SA and Victoria (VIC):

- A high-pressure system moving from the west was dominant over SA and VIC on Saturday afternoon, with clear, still, sunny and above average temperatures.

Figure 1 Weather analysis for 12:00 Saturday 25 August 2018



2.1.2 Severe weather warnings

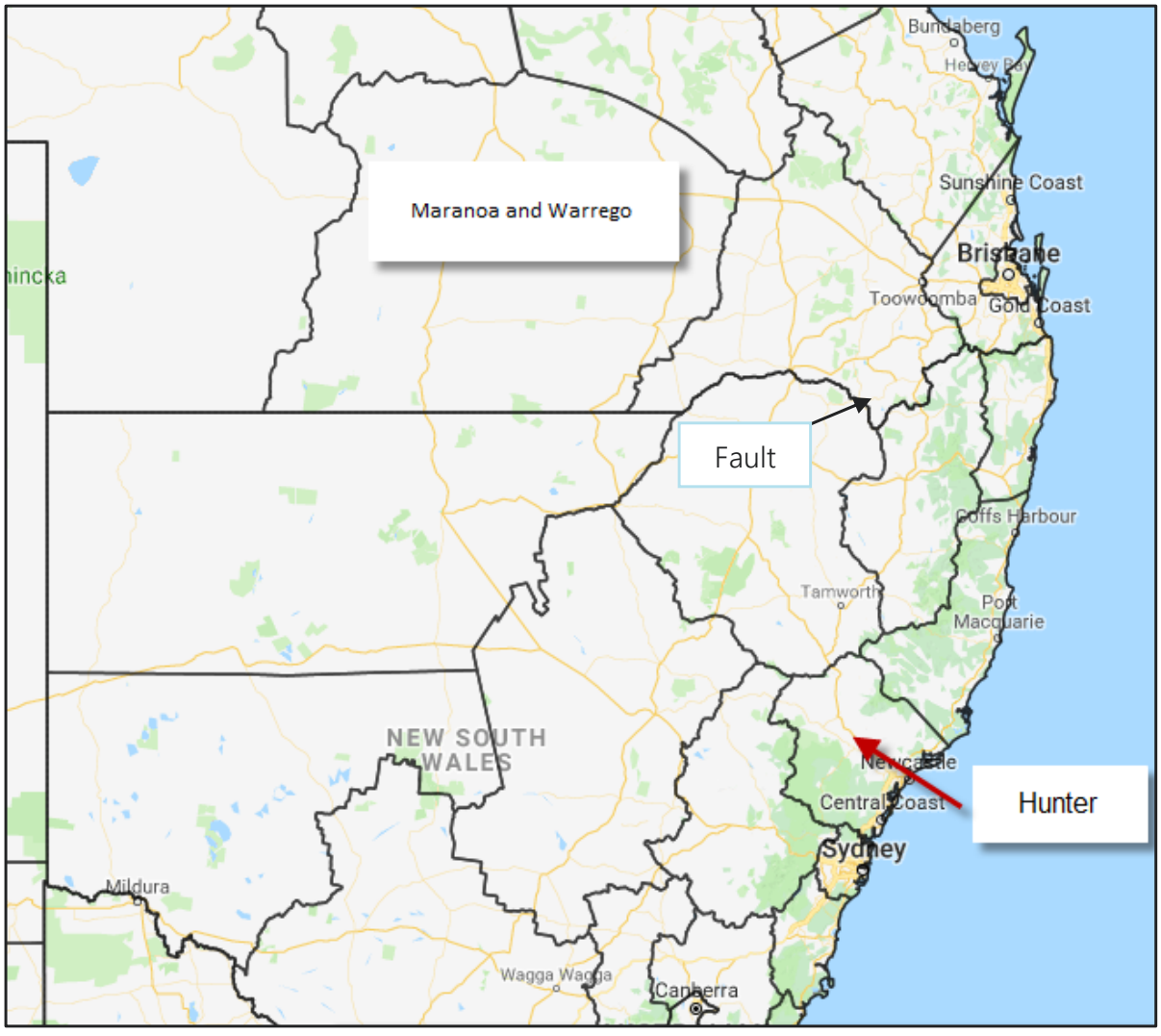
The following severe weather warnings were in place during the event which occurred at 13:11:39.

Table 2 Severe weather warnings southern QLD & northern NSW in place during the event – 25 August 2018.

Issued	Reason	Districts	Areas affected	Cancelled
13:04 Re-issued 15:46 EST	Damaging winds and large hailstones	Maranoa and Warrego forecast district	Charleville, Cunnamulla, Bollon, Augathella and Wyandra	17:24
13:45	Heavy rainfall and damaging winds	Hunter forecast district	Gosford, Cessnock, Maitland and Kulnura	15:36

Further warnings were issued for a larger area later in the day on 25 August 2018. Areas included the Sydney metropolitan area, NSW mid-north coast, and Hunter forecast districts.

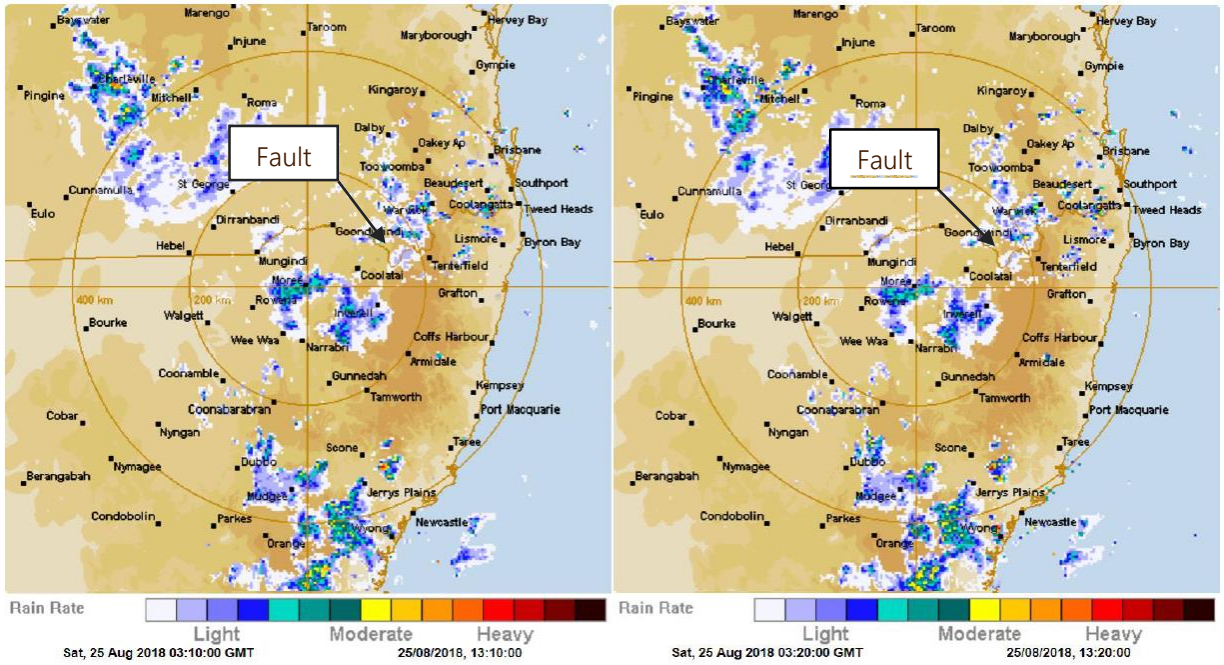
Figure 2 Relevant weather forecast districts – QLD and NSW



2.1.3 Storm activity

The following radar charts shows the radar reflectivity at 13:10 and 13:20, showing scattered showers and thunderstorms around the location of the fault at the time of the event.

Figure 3 Radar reflectivity at the time of the event



Based on currently available weather service provider information, AEMO has not confirmed cloud-to-ground lightning strikes recorded within a 10 km radius of the transmission line in question at the time of fault incidence. This remains a key focus of AEMO's investigation.

2.2 Pre-event system configuration

The NEM was in a secure, system normal state prior to the event. There were no major network outages or works in the vicinity of the fault. The interconnectors between each region had the following targets for the dispatch interval ending 13:15 hrs:

- QNI target was 828 MW QLD to NSW.
- Directlink target was 97 MW QLD to NSW.
- VIC–SA target was 245 MW SA to VIC.
- Murraylink target was 18 MW SA to VIC.
- VIC – NSW target was 405 MW VIC to NSW.
- Basslink target was 478 MW TAS to VIC.

A summary of the operational demand, generation mix, and energy pricing for each region of the NEM for 25 August 2018 is shown in detailed figures in Appendix A.

2.3 AEMO considerations

On 25 August 2018, AEMO received advice from weather providers as summarised in Section 2.1. As a result, AEMO was tracking storms and monitoring conditions relative to transmission networks through real-time systems, weather providers, and information provided by TNSPs.

The NEM was in a secure operating state and forecasts were for low electricity demand, with a record winter low electricity demand forecast for SA.

- Wind generation was very low in all regions.
- Large-scale solar generation in NSW was low.
- Large-scale solar generation in QLD was moderate.
- Low rooftop photovoltaic (PV) generation in NSW and moderate rooftop PV generation in QLD was resulting in some elevated operational demands in those regions at the time of the event.
- High rooftop PV generation for this time of year in VIC and SA was resulting in lowered operational demands in those regions.

3. Event

Table 3 sets out the sequence and timing of the power system separation and UFLS events, as currently understood. Each source of information has a differing level of accuracy and resolution, a comprehensive time line using a common source of information will be completed in the final report.

Table 3 Provisional sequence of events and timing, 25 August 2018

Time	Events/Comments
13:11:39	Dumaresq – Bulli 8L 330 kV Line tripped
13:11:39	Dumaresq – Bulli 8M 330 kV Line tripped
13:11:41	Tamworth – Armidale 86 330 kV Line tripped at Armidale end only
13:11:45	Automatic AUFLS-2 scheme trip of TAS industrial load 81 MW
13:11:46:901	SA separated from VIC at the Heywood Terminal station Operation of the Heywood Emergency Control Scheme
13:11:47:686	Automatic UFLS scheme trip of one Alcoa Portland Aluminium (APD) Potline 278 MW
13:11:47	Automatic UFLS scheme trip of two Tomago potlines, totalling 617 MW
Timing to be confirmed	Automatic UFLS scheme trip of load in: • Endeavour Energy 12 MW (20,000 customers) • ActewAGL 5.5 MW • AusGrid 60 MW (45,000 customers) • Essential Energy 45 MW (30,000 customers) • Industrial load 2 MW
13:20	Separation constraints applied

3.1 Event analysis

AEMO is presently collecting incident data and high-speed recorder measurements of the event from TNSPs and generators. Once this information is obtained, AEMO will carry out system event analysis, and publish further results and findings in a final report.

3.2 Line trips

There were two series of line trips during the event; the two line trip events were:

1. The trip of both circuits of the Dumaresq – Bulli Creek 330 kV lines (QNI) approximately 73 km from Bulli Creek was observed at 13:11:39.
2. The trip of the Tamworth – Armidale 86 line (330kV) at 13:11:41.

3.2.1 Dumaresq – Bulli Creek 330 kV lines

The Dumaresq – Bulli Creek 330 kV transmission lines (8L and 8M) comprise two circuits strung on single tower structures. The lines form the alternating current (AC) interconnection between the QLD and NSW regions. At the time of the event, 857 MW was being transferred via lines 8L and 8M in the direction from QLD to NSW.

The route of the 8L and 8M transmission lines did not transit any weather districts with active severe weather warnings at the time of the fault, though AEMO was monitoring storm activity in the area. Prior to the event the 8L and 8M lines were not considered 'vulnerable' to lightning strikes tripping both lines simultaneously. Consistent with AEMO's reclassification criteria[2], AEMO did not reclassify the trip of both lines due to lightning as a credible contingency prior to the event, under clause 4.2.3A of the NER.

AEMO has been advised by Powerlink that evidence of a flashover consistent with a lightning strike has been found at the location of the fault. Based on this advice, and pending the outcomes of AEMO's further investigation, AEMO will reclassify the loss of both the 8L and 8M lines as a single credible contingency when lightning is in the vicinity of the lines.

3.2.2 Tamworth – Armidale 86 line

AEMO is investigating the circumstances surrounding the conditions of the Tamworth – Armidale line 330 kV transmission line (86 line) trip and is working with TransGrid to retrieve the relevant data.

3.3 Heywood interruption

The separation of SA from the rest of the NEM was not initiated by a transmission fault on the SA–VIC Heywood interconnector. This resulted from the action of a Heywood Emergency Control Scheme. At the time of the disconnection of QNI, the Heywood interconnector was transferring 165 MW from SA towards VIC. At the time of the separation of SA and VIC the Heywood interconnector was transferring 430 MW from SA towards VIC.

The Heywood Emergency Control Scheme activates based on system conditions measured locally at Heywood Terminal Station, including frequency, voltage, and changes in flow on the Heywood interconnector. It acts pre-emptively to disconnect the Heywood Terminal Station from the Victorian 500 kV network so that an islanded SA power system would not remain connected to the Alcoa Portland Aluminium Smelter (APD) load at Portland. This reduces the risk of the islanded frequency in SA collapsing. AEMO will review the operation of this control scheme during the event as part of ongoing investigations.

3.4 Under-frequency load shedding (UFLS)

Automatic UFLS is implemented to restore the balance of supply and demand if system frequency drops below the operational set point of UFLS relays during a major disturbance.

Each region has several pre-programmed UFLS relays that monitor system frequency. If the frequency drops below the set level, the relay will trigger the opening of a circuit breaker, automatically disconnecting the attached load from the power system. Different frequency set points are programmed across the relays, designed to disconnect progressively larger amounts of load as frequency declines. UFLS operates on the mainland from 49 hertz (Hz) down to 47.5 Hz and in TAS from 48 Hz down to 47 Hz.

TAS has an Adaptive UFLS scheme (AUFLS2) in addition to the UFLS scheme. The AUFLS2 scheme is designed to reduce the amount of FCAS required to be enabled in Tasmania. The scheme disconnects interruptible customer load from TasNetworks' network under a contractual arrangement if the frequency in TAS falls below a set value. The AUFLS2 scheme operates within the range 49 Hz to 48 Hz.

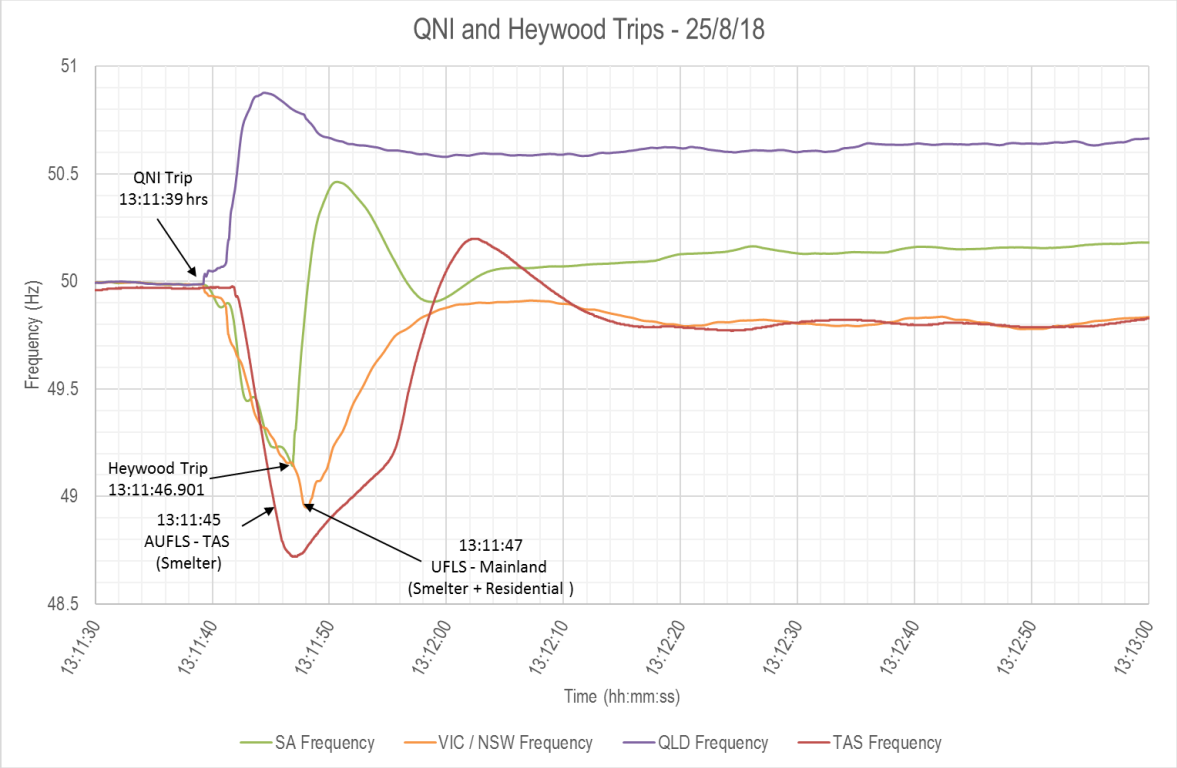
The diagram below in Figure 4 shows the frequency observed in each region during the event.

- The operation of the AUFLS2 in Tasmania can be seen by the correction of the frequency after reducing to 48.75 Hz.
- Operation of the Heywood Emergency Control Scheme can be seen prior to SA reaching 49 Hz (operating according to design).

[2] The reclassification criteria are established and reviewed under clause 4.2.3B of the NER and set out in section 11 of AEMO's Power System Security Guidelines (SO_OP_3715), available at https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Power-system-operation/Power-system-operating-procedures.

- The operation of the UFLS in NSW / VIC can be seen by the correction of frequency after reducing to just below 49 Hz.

Figure 4 Regional frequency during the separation events on 25 August 2018



3.5 Generation response

AEMO has commenced assessment of the response to the event from all NEM generators (including FCAS provision), and from domestic rooftop PV. This will form part of AEMO's incident investigation and will be presented in the final report.

3.6 Basslink response

In response to the fall in power system frequency on the mainland, the Basslink HVDC interconnector automatically increased power transfer in the TAS to VIC direction. This provided support to frequency on the mainland, and caused frequency to fall in TAS.

This occurred due to the action of the Basslink frequency controller, which rapidly and automatically adjusts the MW flow on Basslink based on the difference in frequency between the TAS and VIC ends of the link.

Basslink was initially operating at around 500 MW transfer from the TAS end towards VIC, and rapidly increased transfer to the maximum 630 MW equipment limit, as measured at the TAS end of the link. This resulted in a decline in frequency in TAS to below the frequency trigger point of the AUFLS2 control scheme, automatically interrupting industrial load in Tasmania contracted to provide this facility.

System frequency in TAS did not reach 48 Hz, therefore no generalised UFLS was triggered in the region.

4. Restoration

Table 4 provides a summary of the major steps in the restoration process

Table 4 Load restoration sequence of events

Time	Events/Comments
13:12:54	AEMO gave permission for TAS industrial load to be restored once power system frequency returned to normal, in accordance with AEMO's power system restoration procedures for TAS
13:30	AEMO authorises to synchronise VIC and SA
13:33	Tomago Potlines given permission to restore load
13:35:50	Vic – SA tie lines both circuits restored and synchronised
13:38	APD Potline given permission to restore load
13:44	Tasmanian industrial load restoration commenced
13:44	AEMO gace permission to restore remaining NSW customer load
13:58	APD Potlines restored
14:20:16	8L Dumaresq – Bulli Line restored
14:20:16	QLD and NSW re-synchronized
14:33	8M Dumaresq – Bulli Line restored
15:16	Tamworth – Armidale 86-line 330 kV line returned to service

4.1 Restoration analysis

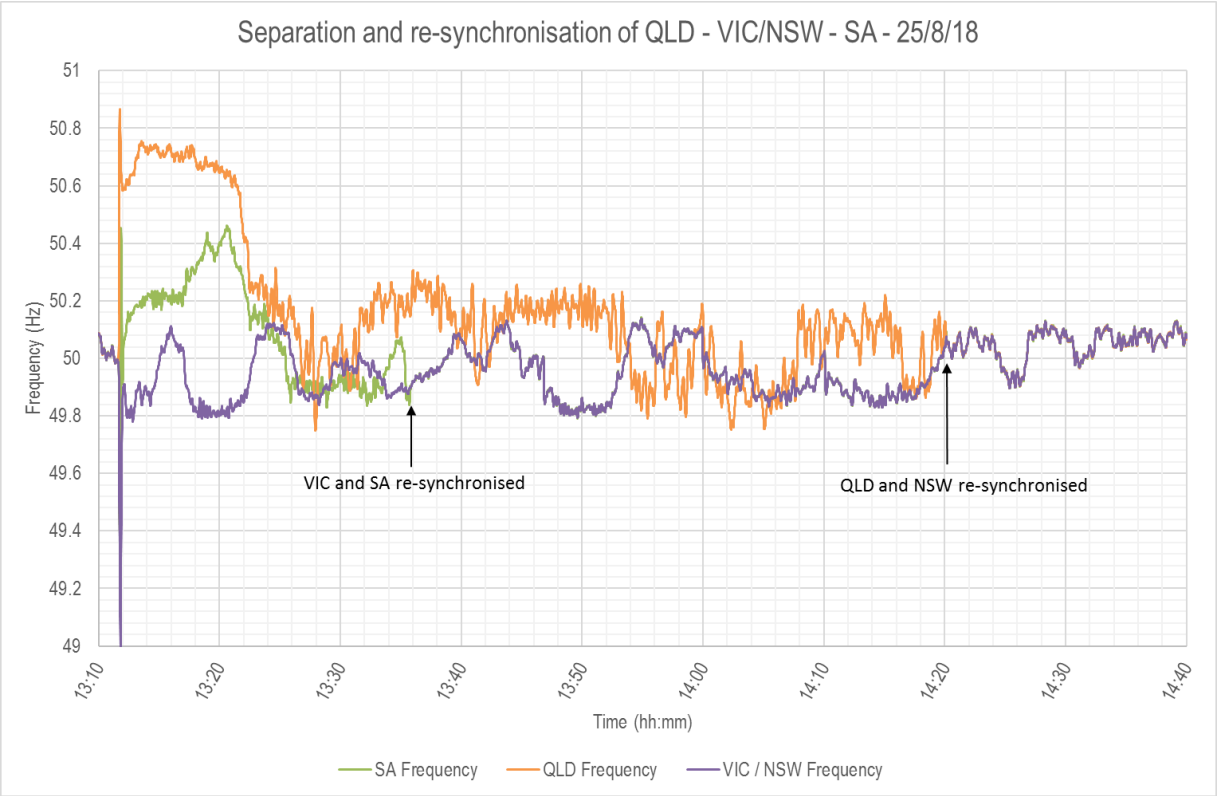
4.1.1 Regional re-synchronisation

AEMO worked with regional TNSPs to co-ordinate the re-synchronisation of the SA and QLD regions. Re-synchronisation of the SA region to VIC occurred at 13:35, followed by QLD to NSW at 14:20.

To synchronise two adjacent regions, the frequency in the two regions must be individually managed to come together.

In Figure 5, SA (green) can be seen matching VIC / NSW frequency and synchronising at 13:35. QLD (orange) can be seen synchronising with NSW at 14:20.

Figure 5 Re-synchronisation of SA and QLD to NEM



4.1.2 Load restoration

Table 5 Load without supply duration

Load	Total load (MW)	MW tripped	Tripped	Permission to restore	Duration without permissible access to power
Tomago	964	617.0	13:11:47	13:33	22 Minutes
APD	470	278.0	13:11:47	13:38	27 Minutes
TAS industrial	150	81.0	13:11:45	13:13*	2 Minutes
NSW customers	7,843**	124.5	TBC	13:44	
TOTAL		1,100.5			

* AEMO gave permission for industrial load in TAS to be restored once power system frequency returned to normal, in accordance with AEMO's power system restoration procedures for TAS. The load commenced restoration at 13:44.
**Total NSW operational demand at 13:00 on 25 August 2018.

5. Market impacts

Prior to the event, energy prices in mainland regions were in a range from $70 per megawatt hour (MWh) to $100/MWh. TAS was exporting toward the mainland with prices around $10/MWh.

Following the event:

- NSW and VIC energy prices remained relatively stable as the amount of UFLS in those regions approximately balanced the imports lost from QLD and SA.
- The SA energy price reduced to -$1,000 (5-minute dispatch interval) and around -$450/MWh (30-minute settlement period) due to the loss of export to VIC, causing a temporary excess of supply in SA. Prices quickly recovered to pre-event levels.
- QLD's energy price was initially stable but then increased to around $1,400/MWh in dispatch interval ending 13:40 hrs. This was a result of AEMO reclassifying loss of 8L and 8M as a single credible contingency.
  - FCAS constraints co-optimise the supply of contingency FCAS with the largest generation contingency. As a result, AEMO systems sought to reduce the largest generation contingency and all large generators in QLD were constrained down to 350 MW. The price increased due to alternative generation being dispatched into service. Figure 6 shows the steady reduction in the large coal generators due to co-optimisation from 13:25 to 14:25 hrs.
- TAS energy prices remained relatively stable, due to increased Basslink export to VIC being approximately matched by load reduction in TAS.
- All mainland regions experienced FCAS prices at the price cap of $14,500/MWh. This is a trigger for the Australian Energy Regulator (AER) to prepare a pricing event report. QLD was subjected to local FCAS requirements while QNI was reclassified, creating prolonged higher FCAS pricing in the QLD region.

Figure 6 shows the gradual dispatch down of coal-fired generation down from 13:25 to 14:25 due to co-optimisation of FCAS requirements with Queensland FCAS prices.

Figure 7 shows FCAS prices in Queensland prior, during, and after the event on 25 August 2018.

Figure 6 Queensland FCAS co-optimisation of coal-fired generation

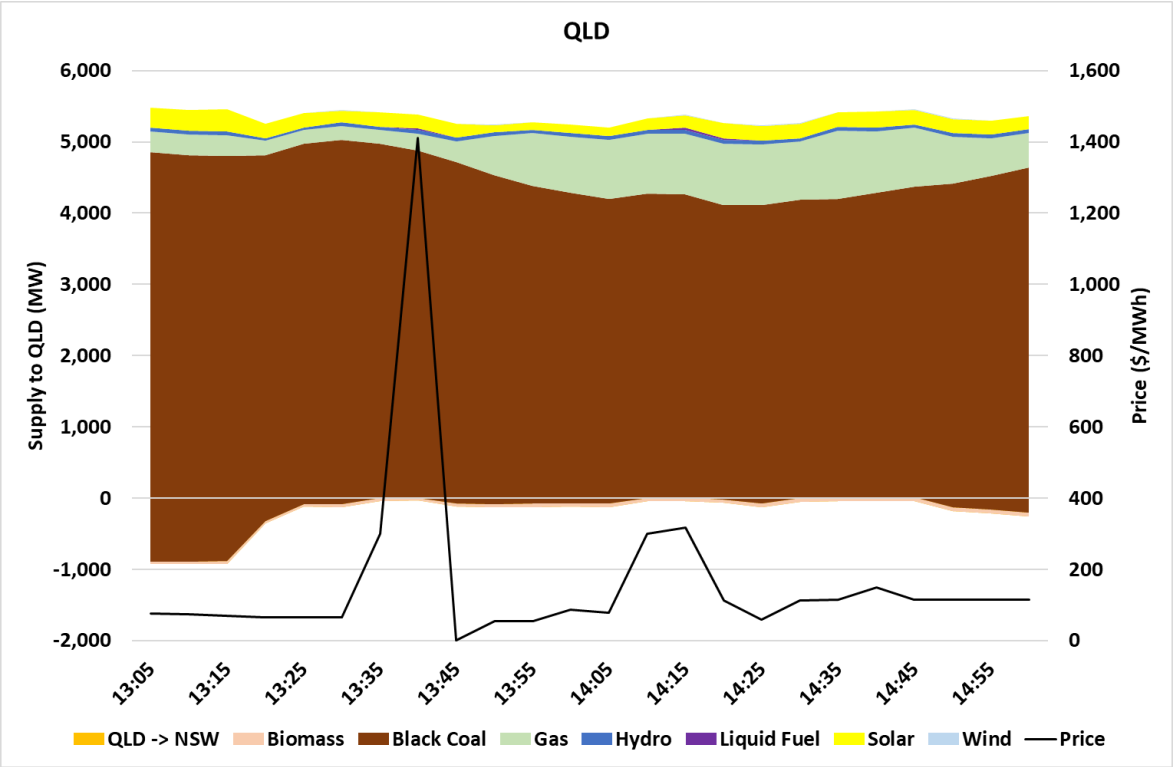
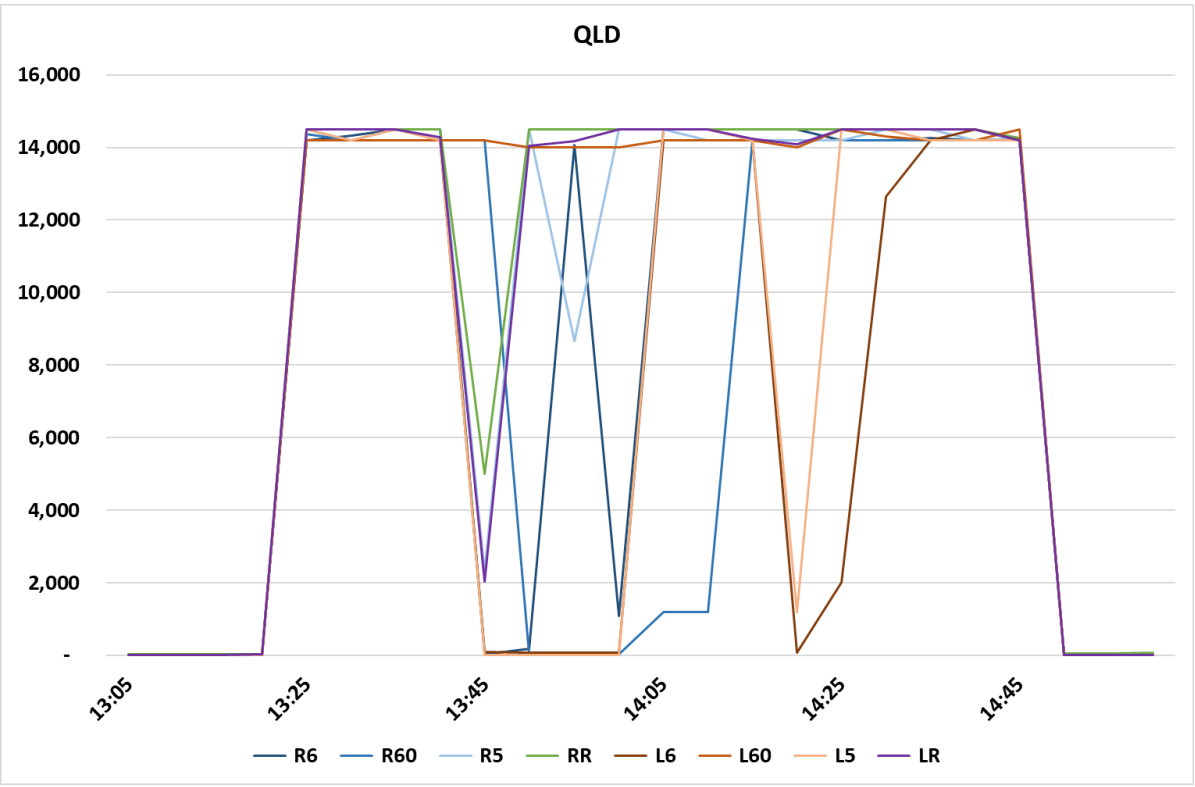


Figure 7 QLD FCAS prices



6. Next steps

AEMO will continue its investigation into how each relevant component of the NEM responded under the circumstances of the events of 25 August 2018.

An overview of those activities and areas for investigation is provided in the table below. A date for publication of AEMO's final incident report will be confirmed once all information and data has been collected and reviewed.

Table 6 Next steps – summary of activities

Area	Analysis to be performed
Detailed sequence of events	A comprehensive timeline of events based on validated data will be confirmed.
Market assessment report	The market impact of the event will be examined.
FCAS	Assessment of the performance of the enabled FCAS providers and recommendations for any future changes to FCAS requirements.
AEMO actions	AEMO will review and report on its actions surrounding the event and restoration.
Generator performance	AEMO will assess the performance of generating units against their performance standards, and against available simulation models. AEMO will also assess the response of distributed generation sources such as co-generation units and rooftop PV.
Network performance	AEMO will assess the performance of the transmission and distribution networks, relevant control schemes and protection equipment.
Mitigation measures	AEMO will explore potential mitigation measures and develop recommendations for the future.
Long term implications	AEMO will examine the implications of this event and recommend future work to improve the operation and resilience of the NEM power system.

For AEMO to complete its review and prepare a final incident report, the following should be noted:

- Under clause 4.8.15 of the NER, registered participants have 20 business days to provide data and information in response to a request from AEMO. AEMO issued initial requests on Monday 27 August 2018 to registered participants whose facilities are thought to have been affected by the event.
- AEMO will undertake detailed modelling and analysis of the responses of power system equipment to faults or other changes in power system conditions.
- Additional data or information may need to be requested from participants following initial analysis and modelling.

A1. Supply mix and energy spot prices for each region, 25 August 2018

Figure 8 Supply mix and energy spot price in QLD region

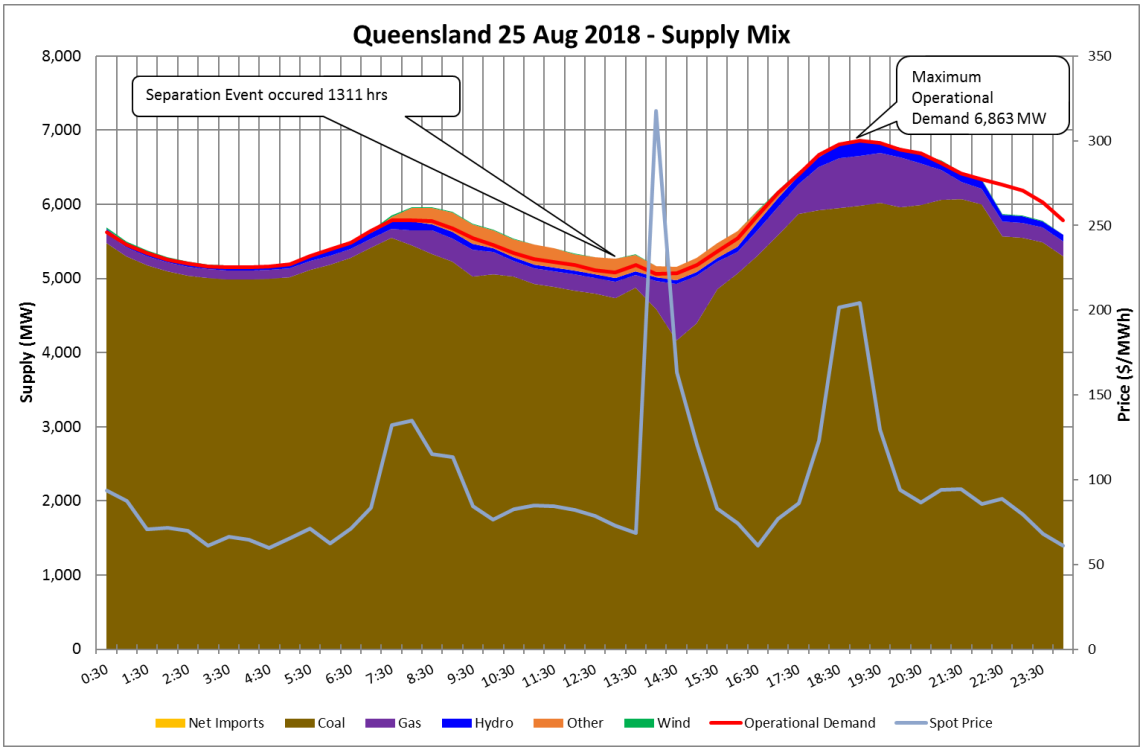


Figure 9 Supply mix and energy spot price in NSW region

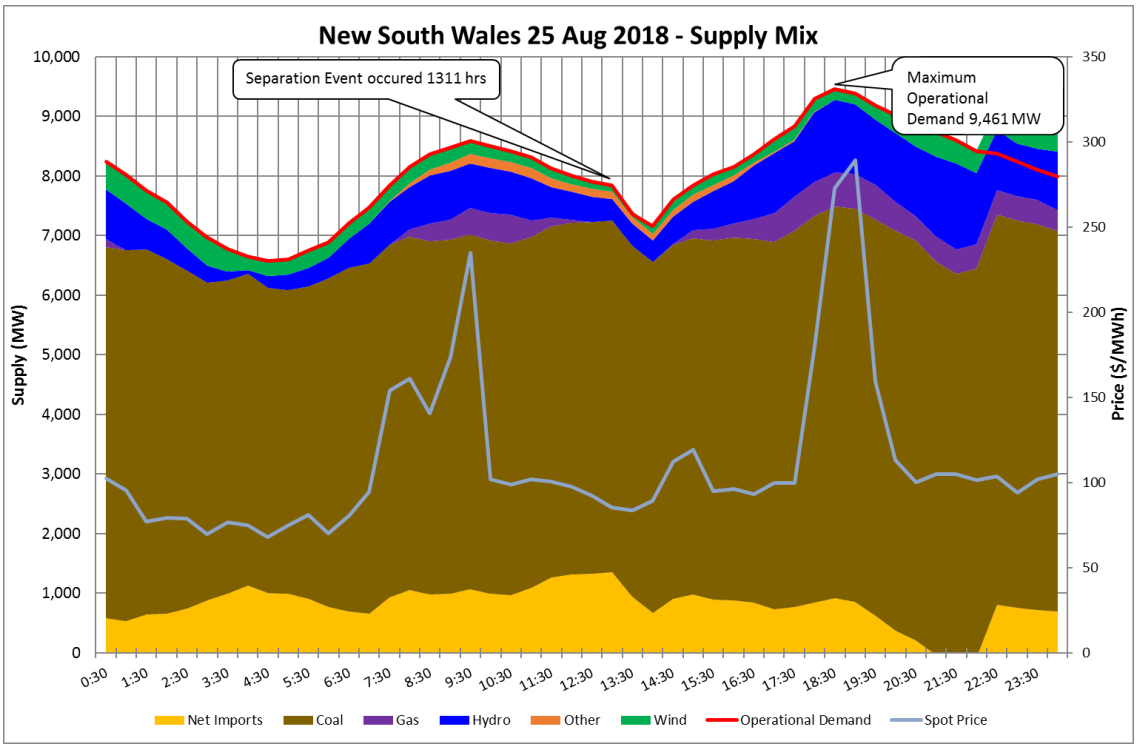


Figure 10 Supply mix and energy spot price in VIC region

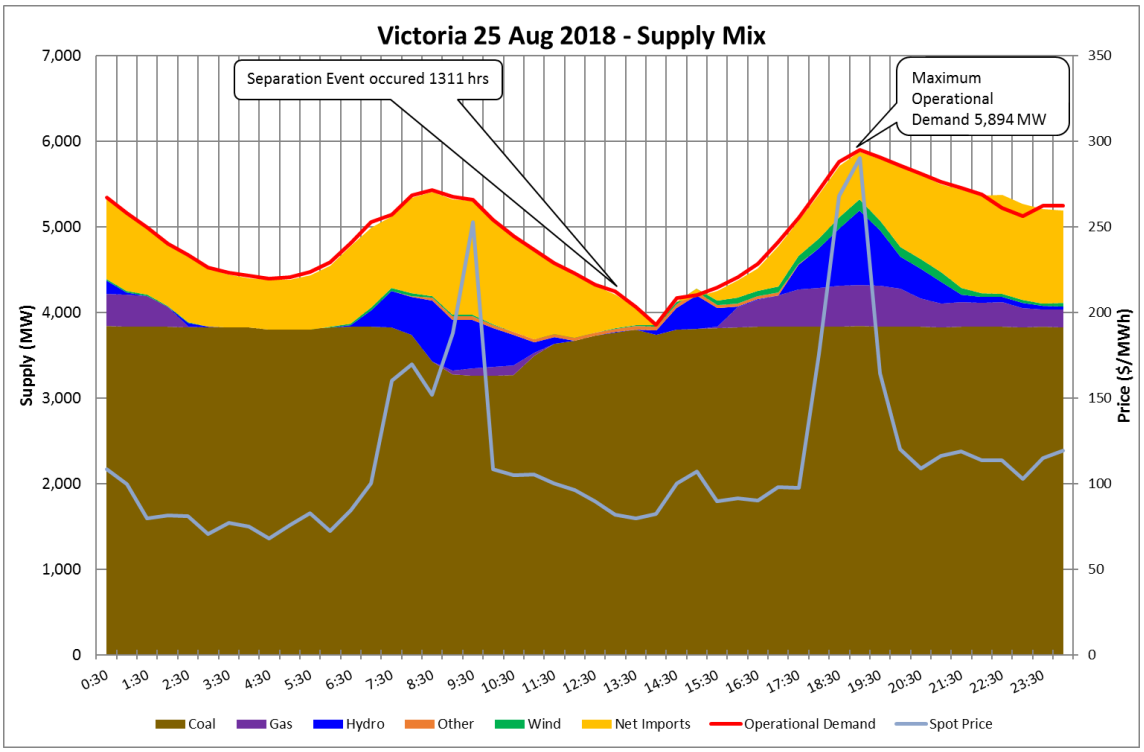


Figure 11 Supply mix and energy spot price in SA region

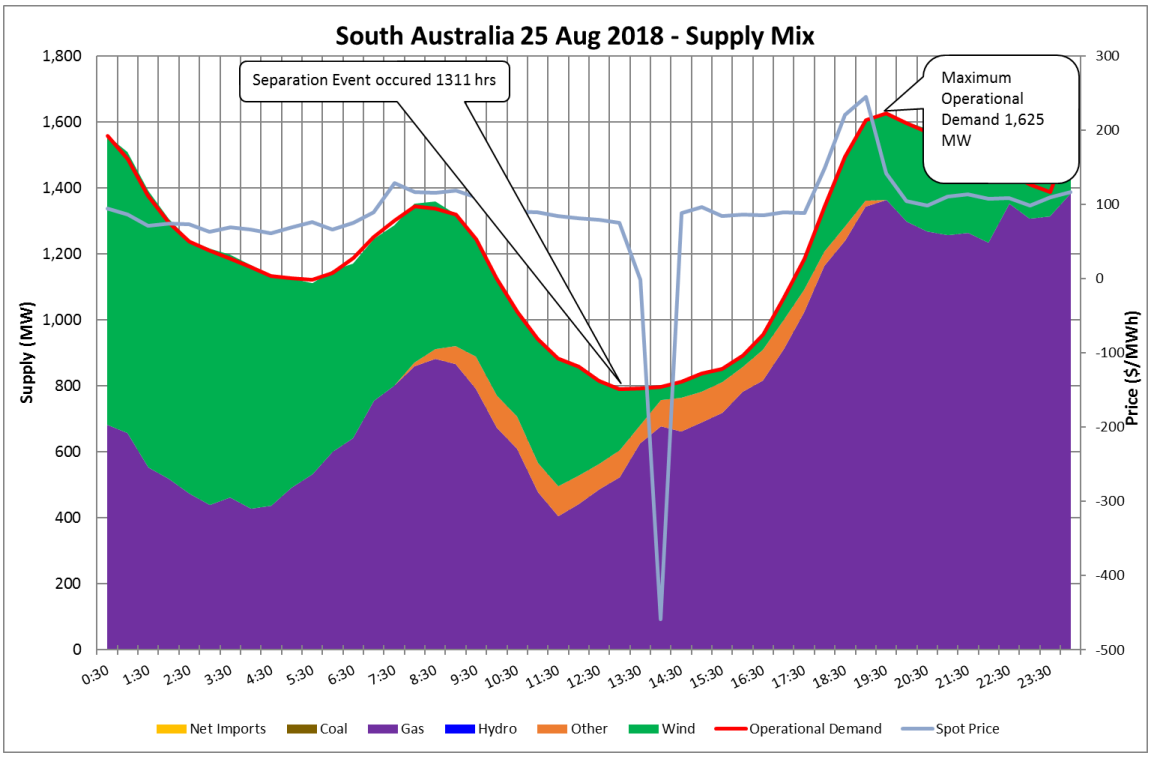


Figure 12 Supply mix and energy spot price in TAS region